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(56) Documents Cited

US 5730348 A US 5235728 A US 5081709 A

US 4083481 A

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(54) Abstract Title

Measuring instrument having a fixing device

(57) The invention relates to mobile measuring instruments (7) which can be worn on the bodies of people, having a spring-less fixing device (1) for detachable fastening to items of clothing, having the following features:

a) a plate (8) has on one of the two comparatively short sides a recess (9) having a cutout (10),

b) a plane slide element (11) has a guide element (12) and with this is connected to the plate (8) so as to be shiftable over the cutout (10),

c) both the plate (8) and the slide element (11) are provided, on the opposing comparatively long sides of the plate (8), with pins (2, 3; 4, 5) which are parallel to each other,

d) the pins (2, 3) of the plate (8) are held in a stationarily rotatable manner in the housing (6) of the measuring instrument (7), and wherein

e) the pins (4, 5) of the slide element (11) that are arranged in two guides (17) in the housing (6) of the measuring instrument (7) are, as a function of the shifting path of the slide element (11), shifted between a maximum distance and a minimum distance from the pins (2, 3) of the plate (8).

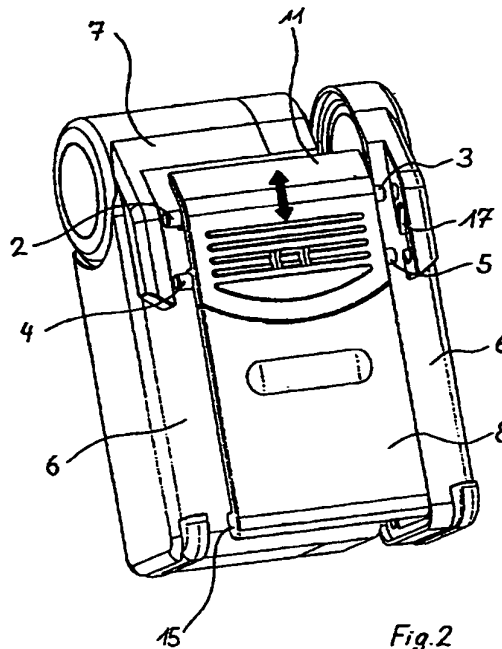


Fig. 2

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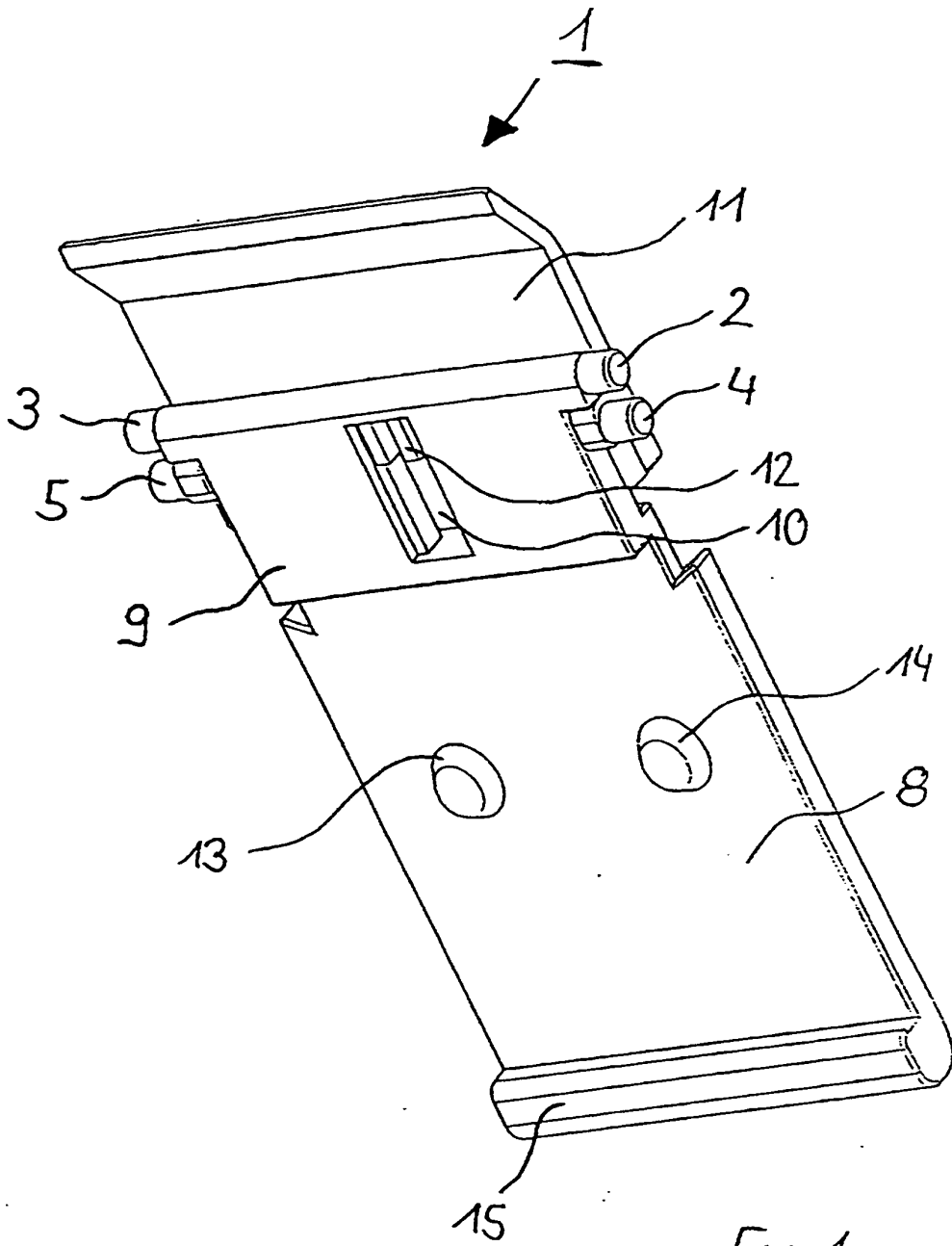
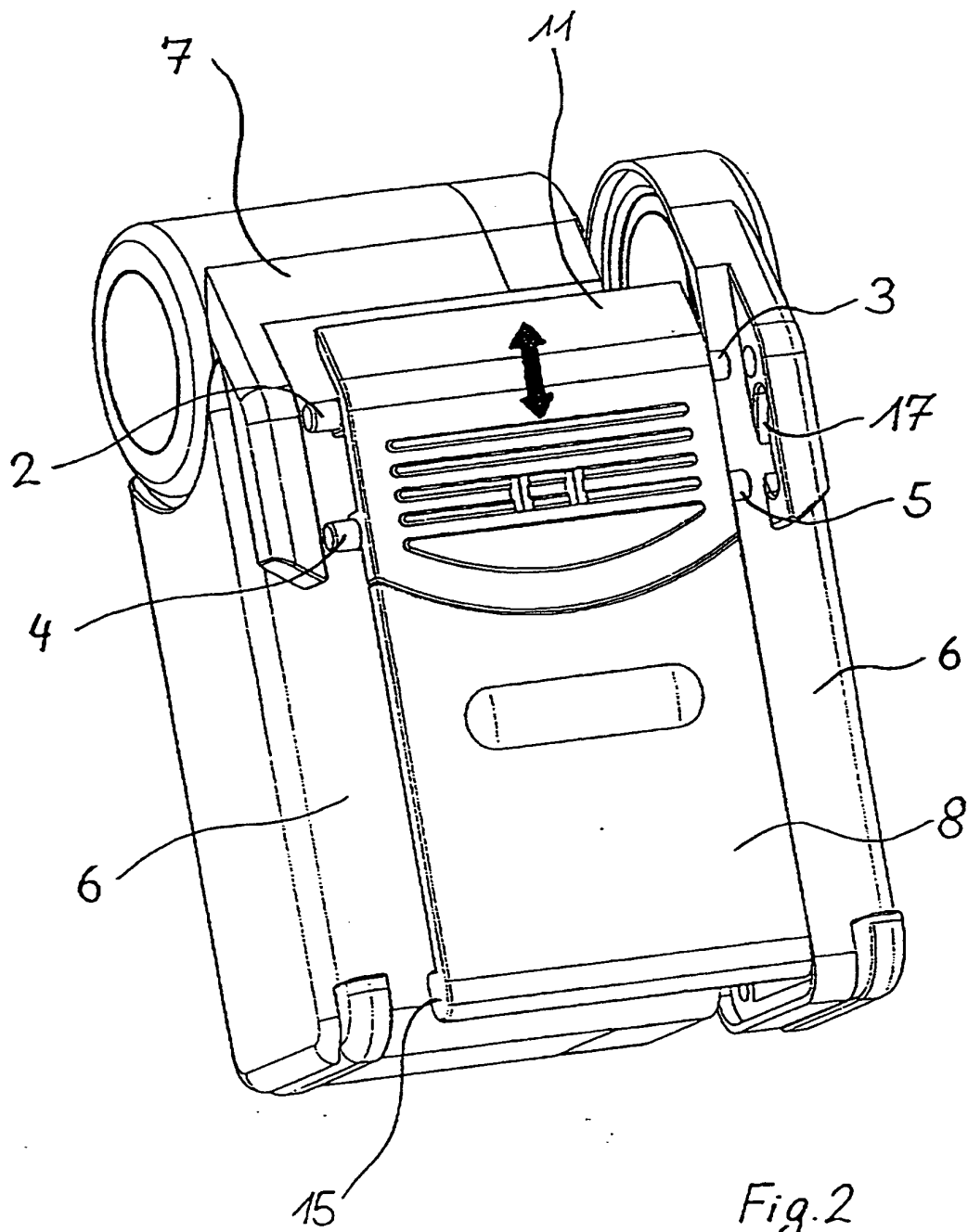


Fig. 1



Description

5

Measuring instrument having a fixing device

10 The invention relates to a measuring instrument having a fixing device for detachable fastening to items of clothing.

Measuring instruments of this type are, for example a compact, mobile gas-measuring instruments with a warning function, worn by individual people on the body or on the clothing. People who are exposed to
15 danger by gases wear corresponding devices in order to be warned optically and/or acoustically if a certain, specified gas concentration is exceeded.

Depending on the clothing and activity of the user, the measuring instrument must offer the
20 possibility of being able to be fastened simply and reliably, but detachably, to different items of clothing.

Usually, a force-locking fastening with spring-mounted clips is used, in which case the holding force
25 is dependent on the spring force, on the nature of the surface and the shape of the fixing device, and on the nature of the item of clothing. Depending on the structural embodiment of the fixing device, a relatively high actuating force is required in order to
30 open the fixing device. The spring can, in a manner dependent on ageing, weaken in terms of spring force and operational reliability.

Embodiments of the present invention aim to provide a measuring instrument having a fixing device
35 which is improved in comparison with the prior art, and in which the fixing device does not have a spring and

is easy and reliable to actuate.

According to an aspect of the invention there is provided a measuring instrument having a fixing device for detachable fastening to items of clothing, the
5 fixing device comprising: a plate which has, on one of two comparatively short sides, a recessed portion having a cutout, a substantially planar slidable element having a guide element with which it is connected to the plate so as to be movable over the
10 cutout, wherein the plate and the slide element are each provided with a pair of protrusions, one located on each of the opposed comparatively long sides of the plate, the plate protrusions and the slide element protrusions being substantially parallel, the plate
15 protrusions being retained stationary and rotatable in a housing of the measuring instrument, and the slide element protrusions being each located in a guide member in said housing, so as to be movable between maximum and minimum distances from the plate
20 protrusions as the slide element moves relative to the plate.

A fundamental advantage of the invention results from the fact that the fixing device of the measuring instrument comprises only two components, which
25 cooperate with each other in such a way that the fixing device is opened for fastening/detaching by a first slide position, while in the second position, the fixing device is closed, i.e. fixed.

Further, preferred features may be found in the
30 attached dependent claims.

A detailed description of an embodiment of the invention will now be given by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a three-dimensional view of the
35 fixing device 1 in the opened state, seen from the measuring instrument 7; and

Figure 2 shows the fixing device according to Figure 1 on the measuring instrument 7 in the closed state, seen from the outside.

5 Figure 1 shows a fixing device 1 according to this embodiment, in which the fixing device is rotatably fastened in a housing 6 (Figure 2) of a measuring instrument 7 by means of protrusions 2, 3, 4 and 5 is movably held in a respective guide 17 in the housing 6. The fixing device 1 comprises two partial elements, 10 namely a first partial element comprising, for example, a rectangular plate 8 having a recess 9 and a cutout 10 which determines a length of a shifting path, and a plane slide element 11, which is likewise rectangular in the example, having a guide element 12, by way of 15 which the slide element 11 is connected to the rectangular plate 8 by means of the cutout 10. The guide element 12 can, for example, be in the form of two nubs which overlap the cutout 10.

In this embodiment the fixing device 1 comprises 20 two partial elements, which are preferably produced from glass fibre reinforced polyamide, for example moulded in the injection-moulding process, and further that a spring having time-dependent operational properties is not required.

25 The fixing device 1 can be moved by shifting (direction of arrow in Figure 1) the slide element 11 between a maximum distance and a minimum distance between the protrusions 2, 3 of the rectangular plate 8 and the protrusions 4, 5 of the slide element 11.

30 Thus, the slide element 11 can be opened and closed almost without force, with a stable, form-locking closing resulting by means of the circular or curved contouring of the partial elements in the closed position.

35 The shaping of the fixing device 1 is such that by means of the slide element 11 which is bent towards the

housing 6 on the side which faces away from the rectangular plate 8, and by a reinforcement 15 of the rectangular plate 8 on a comparatively short side which faces away from the slide element 11 with substantially the same thickness of the plate 8 in the direction of the housing 6, a sufficiently strong clamping and friction is achieved, even in the case of smooth and thin materials, and on the other hand, sufficient space remains between the housing 6 and the fixing device 1, for example for a solid leather belt. A nub bar made of silicone rubber inserted into cutouts 13, 14 in the plate 8 increases the friction on smooth materials and can be removed in order to fasten the measuring instrument 7 to thicker materials or belts.

In a closed state, the fixing device 1 is pushed together; in an opened state, which can be folded out from the housing 6 by a maximum of approximately 1.0 to 1.5 cm, the slide element 11 with its protrusions 4, 5 in slit-like guides 17 on either side of the housing 6, is pushed away from the plate 8 to the maximum extent.

The upper portion of the slide element 11 then extends with space at a distance from the bevelled housing 6 and permits an appropriate folding out of the fixing device 1.

Claims

1. A measuring instrument having a fixing device for detachable fastening to items of clothing, the
5 fixing device comprising:

a plate which has, on one of two comparatively short sides, a recessed portion having a cutout,

a substantially planar slidable element having a guide element with which it is connected to the plate
10 so as to be movable over the cutout,

wherein the plate and the slide element are each provided with a pair of protrusions, one located on each of the opposed comparatively long sides of the plate, the plate protrusions and the slide element
15 protrusions being substantially parallel, the plate protrusions being retained stationary and rotatable in a housing of the measuring instrument, and the slide element protrusions being each located in a guide member in said housing, so as to be movable between
20 maximum and minimum distances from the plate protrusions as the slide element moves relative to the plate.

2. A measuring instrument according to claim 1 wherein the slide element and the plate have a
25 complementary circular or curved shape at the end regions in which they face each other, so that in a pushed-together condition their ends are substantially flush.

3. A measuring instrument according to claim 1 or claim 2 which is formed of glass fibre reinforced
30 plastics, carbon reinforced plastics or glass fibre reinforced polyamide.

4. A measuring instrument according to any of claims 1 to 3 wherein, for articulation of the
35 measuring instrument on the housing, the slide element has an end section which is bent at an angle to the

housing on a side which faces away from the plate.

5 5. A measuring instrument according to any of
claims 1 to 4 wherein the plate has a reinforced
portion of substantially the same thickness as the
plate on the comparatively short side thereof which
faces away from the slide element, and extends in the
direction of the housing.

10 6. A measuring instrument according to any of
claims 1 to 5 wherein the plate has at least one cutout
portion for releasably receiving a nub bar of silicone
rubber, plastics or other suitable material.

15 7. A measuring instrument according to any of
claims 1 to 6 wherein the measuring instrument
comprises a mobile gas-measuring instrument with a
warning function.

8. A measuring instrument substantially as
herein described with reference to the accompanying
drawings.



Application No: GB 9915058.3
Claims searched: 1-8

Examiner: A J Rudge
Date of search: 20 September 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): E2A(AGLD,AGMH,AGMK,AGRA,AGRX)

Int CI (Ed.6): A44B-11/00;11/02;11/06;11/12;11/14;21/00

Other: Online databases: WPI, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5,730,348 (Tien Tse-Hsiung)	
A	US 5,235,728 (HM Electronics)	
A	US 5,081,709 (Motorola)	
A	US 4,083,481 (Motorola)	

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